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To

Prof. V. Weisskopf
Director-General
CERN

Report by Andrea Wataghin, Ford Foundation Visiting Scientist from October, 1960 to October 1961

The activities of the emulsion group include exposures to the PS, technical development of high pulsed magnetic fields, technique of processing of nuclear plates. Even though I participated in some exposures and processings my main interest was the measurement and analysis of the interaction of 16 GeV/c π^- with emulsion nuclei.

This beam allowed us to examine many aspects of pions interactions.

The problem of measuring the pβ of high energy particles led us to multiple Coulomb scattering measurements at large cell-sizes. In this region we found a discrepancy between the predictions of the point charge theory of Williams and Molière and the experimental values of the average sagitta (1).

The explanation of the difference is not yet clear: it may be due partly to extended charge corrections, or to the necessity of improving the statistical treatment of the theory.

The consequences of this discrepancy on the value of the scattering constant were analysed by us in a second work (2).

The cross-section for direct-production of electron pairs by pions of 16 GeV/c was measured by our group in collaboration with Bristol, Milano, Bari and Karachi groups. The results are up to now in agreement with existing electro-magnetic theory but further events are being collected to improve the statistics. Preliminary results are in CERN internal report No. 61-20 and in the reports of Aix-en-Provence Conference (Evans et al, Production of electron-pairs by 16 GeV/c pions).

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(1) A. Hossain, F.M.Votruba, A. Wataghin "Multiple scattering measurements in emulsions exposed to momentum analysed particle beams from the CERN Proton Syncrotron. Nuovo Cimento (in press)

(2) On the behaviour of the multiple scattering costant K for nuclear emulsions, at large cell-sizes, by A. Hossain, M.F.Votruba, A. Wataghin, D. Evans. Nuovo Cimento (in press)

Upper limit for diffraction dissociation events by pions has also been obtained by the same collaboration groups and presented at Ais -en- Provence Conference. (Baldassarre et al, Observations on the production of two charged pions by negative pions at 14, 16 and 17 GeV)

The nuclear interactions of 16 GeV π^- have also been measured by us, and are in the process of being analysed.

(Andrea Wataghin)